# 1978 Index to Optical Engineering Volume 17


**Volume 17, No. 1, January/February 1978**

Sensors for Atmospheric Measurement (Guest Editorial), Irving R. Abel . . . . . 5
Spin-Scan Camera System: Geostationary Meteorological Satellite Workhorse for a Decade, Verner E. Suomi, Robert J. Krauss . . . . . 6
Limb Infrared Monitor of the Stratosphere (LIMS) Experiment, Richard W. Drozewski, Marcus R. Hatch . . . . . 14
Lidar in Space, R. T. H. Collis, R. D. Hake, P. B. Russell, S. A. Bowhill . . . . . 23
Remote Measurement of Gases Using Differential-Absorption Lidar, Edward R. Murray . 30
Airborne Fourier Transform Spectroscopy of the Upper Atmosphere, William G. Mankin . . 39
Atmospheric Monitoring Using Heterodyne Detection Techniques, Robert T. Menzies. . . 44
A 10 μm Laser Heterodyne Spectrometer for Remote Detection of Trace Gases, Michael J. Mumma, Theodor Kostiuk, David Buhl . . 50
Point Monitoring of Ambient Concentrations of Atmospheric Gases Using Tunable Lasers, J. Reid, J. Shewchun, B. K. Garside, E. A. Ballik . . . . . 56
Imaging of X-Ray Aurorae from Spacelab, R.A. Goldberg, K. L. Hallam, J. G. Emming . . . 63
Optical Differential Operation Processor, Erich R. Reinhardt, Werner H. Bloss. . . . . 69
Selective Modulation Interferometric Spectrometer, Roy W. Esplin. . . . . 73
Optical Picosecond Spectroscopy, D. Huppert, P. M. Rentzepis, G. E. Busch . . . . . 82
Review of German Standards on Image Assessment, Paul Kuttner . . . . . 90
Underwater Radiance Scanner, Richard D. Anderson. . . . . 94

**Volume 17, No. 2, March/April 1978**

Laser Engineering (Guest Editorial) Malcolm L. Stitch. . . . . 107
Infrared Imaging Using Nonlinear Optical Upconversion, Kamala S. Krishnan, John S. Ostrem, Eddie A. Stappaerts. . . . . 108
Characteristics of Optical Fiber Waveguides, Roy E. Love, Donald B. Keck . . . . . 114
High-Efficiency Frequency Doubling of Nd: YAG, R. M. Kogan, R. M. Pixton, T. G. Crow . . . . . 120
Manufacturing Low Noise HeNe Lasers, J. U. Eynon, W. P. Kolb, I. A. Ramsey . . . . . 125
Scattering Pattern Analysis of Bacteria, Koichi Shimizu, Akira Ishimaru . . . . . 129
Application of Dynalyzer II to X-Ray Quality Control, J. S. Shapiro, A. J. Pellegrino, V. Berluti . . . . . 135
Remote Pollution Probing by Laser-Induced Luminescence Techniques, Richard E. Grojean, John A. Sousa, Joseph F. Roach, Elliot F. Wyner, Masato Nakashima . . . . . 139
Portable Instrument for Simultaneous Recording of Scene Composition and Spectral Reflectance, Joseph K. Berry, Frederick J. Heimes, James A. Smith . . . . . 143
Detection of Atmospheric Pollutants by Quantitative Analytical Spectroscopy Using a Continuously Scanned Tunable Dye Laser, Yoichi Fujii, Tatsuro Masamura . . . . . 147
Use of Fast Fourier Transform in Evaluation of Laser Raman and Fluorescence Decay Times, C. N. Bressel, S. R. Wisotsky, W. E. Vander Velde . . . . . 153
White-Light Amplitude Interferometer with 180-Degree Rotational Shear, J. B. Breckinridge . . . . . 156
Surface & Optical Studies of Diamond-Turned and Other Metal Mirrors, D. L. Decker, J. M. Bennett, M. J. Soileau, J. O. Porteus, H. E. Bennett. . . . . 160
Astigmatic Coherent Processor Analysis, Robert J. Marks II, Steven V. Bell . . . . . 167
Heterodyne Correlation Radiometry, Malvin Carl Teich . . . . . 170
Magnetically Induced Circular Polarization of Emission: Application to Inorganic Complexes, K. W. Hipps, G. A. Crosby . . . . 176
$SiO_2$-Si Film-Substrate Single-Reflection Retarders for Different Mercury Spectral Lines, A. R. M. Zaghloul, R. M. A. Azzam, N. M. Bashara. . . . . 180
Errata: Simple Model of Flare Light in Microdensitometers, Joseph M. Geary. . . . . 185
Errata: Remote Measurement of Gases Using Differential-Absorption Lidar, Edward R. Murray . . . . . 186

**Volume 17, No. 3, May/June 1978**

Industrial Applications of High Power Lasers (Guest Editorial), John F. Ready . . . . . 191
High Power CW $CO_2$ Lasers & Their Applications, Edward V. Locke . . . . . 192
Material Processing with High Power Lasers, Richard A. Hella . . . . . 198
Laser Material Processing, Michael J. Yessik 202
High Power Laser Welding—1978, Conrad M. Banas . . . . . 210
Introduction to Thick Film Resistor Trimming by Laser, Martin Oakes. . . . . 217
Transmissive Optics for High Power $CO_2$ Lasers: Practical Considerations, Glenn H. Sherman, Gene F. Frazier . . . . . 225
Industrial Laser and Work Handler Systems Integration, Derek L. Hine. . . . . 232
Laser Job Shopping Using Today's Laser Technology, Simon L. Engel . . . . . 235
Advanced Lasers for Fusion Applications, W. F. Krupke, E. V. George. . . . . 238
Nonlinear Interferometers for Laser Pulse Shaping, G. A. Massey, K. Shanmuganathan . . 247
Thermoplastic Recording, L. H. Johnson, D. S. Lo, R. W. Honebrink. . . . . 252
The PROM—A Status Report, Robert A. Sprague, Peter Nisenson . . . . . 256
Nonlinear Optical Phase Conjugation for Laser Systems, Victor Wang . . . . . 267
Comparison of Coherent and Incoherent Optical Spectrum Analysis Techniques in Image Evaluation, Scott A. Armstrong, Brian J. Thompson . . . . . 273
Long-Duration Acousto-Optic Memory Correlator, N. J. Berg, B. J. Udelson, J. N. Lee . . 280
Real-Time Spatial Modulators for Optical/Digital Processing Systems, Donald S. Oliver . 288
Shearing Plate Optical Alignment, Fred M. Dickey, T. Mark Harder . . . . . 295
Novel Square Fresnel Lens Design for Illuminating Circular Solar Cells, E. L. Burgess, D. L. Marchi, Helmut Walter . . . . . 299
Rainbow Holograms Using Large-Aperture Condensing Lenses, J. Upatnieks, E. N. Leith, W. R. Ng, J. A. Carney . . . . . 301

**Volume 17, No. 4, July/August 1978**

Spatial Light Modulators (Guest Editorial), David Casasent . . . . . 307
Volume Phase Holographic Storage in Ferroelectric Crystals, W. J. Burke, D. L. Staebler, W. Phillips, G. A. Alphonse . . . . . 308
Optical Information Storage & Spatial Light Modulation in PLZT Ceramics, C. E. Land 317
Photodichroic Alkali-Halides as Optical Processing Elements, Frank Caimi . . . . . 327
Photoconductor-Thermoplastic Image Transducer, W. S. Colburn, B. J. Chang. . . . . 334
E-Beam DKDP Light Valves, David Casasent 344
The PROM—Theory & Applications for the Pockels Readout Optical Modulator, Bruce A. Horwitz, Francis J. Corbett . . . . . 353
Photo DKDP Light Valve: A Review, David Casasent . . . . . 365
Application of Liquid Crystal Light Valve to Real-Time Optical Data Processing, W. P. Bleha, L. T. Lipton, E. Wiener-Avnear, J. Grinberg, P. G. Reif, David Casasent, H. B. Brown, B. V. Markevitch. . . . . 371
Medical Imaging (Guest Editorial), William R. Hendee . . . . . 385
Laboratory & Controlled Clinical Evaluations of Image Properties of Mammographic Screen-Film Systems, Edward A. Sickles, Harry K. Genant, Kunio Doi . . . . . 386
Can Diagnostic Examinations Be Effectively Modeled?, E. P. Muntz . . . . . 390
Radiologic Decision Making & Physical Image Properties, Harold L. Kundel . . . . . 393
Image Noise & Smoothing in Computed Tomography (CT) Scanners, Peter M. Joseph . . 396
Visual Perception Limits in Angiography, Arthur E. Burgess, Keith Humphrey. . . . . 400
Line Spread Instrumentation for Propagation Measurements, Wade H. Bailey, Jr. . . . . 407
Operator Performance Using Conventional or Stereo Video Displays, Ross L. Pepper,, Robert E. Cole, John O. Merritt, David C. Smith. . . . . 411
Electro-Optical Thin Films for Data Storage & Display, Michael R. Smith, Irving J. Bell, Michael Krystich . . . . . 416
Scanning Electron Microscope (SEM) Positive Print Photography, Elmer A. Rosauer, Jerry L. Amenson . . . . . 422
High Resolution Analog Fiber Optics Data Communications System, Gary J. Grimes, David R. Stevens . . . . . 425
Star Simulator Design, Harold H. Bloem, William E. Goetz . . . . . 432
Erratum: Laser Engineering, Malcolm L. Stitch. . . . . 439

**Volume 17, No. 5, September/October 1978**

Optical Properties of Optical Materials (Guest Editorial), Roy F. Potter. . . . . 445
Organic Materials for Optical Devices, Allen Bloom, R. A. Bartolini, H. A. Weakliem. . 446
Measurement of Photoelastic Contents of Optical Materials, Albert Feldman . . . . . 453
Nonlinear Refractive Index of Glasses & Crystals, M. J. Weber, D. Milam, W. L. Smith . 463
The Photorefractive Effect, A. M. Glass . . 470
Scattering Characteristics of Optical Materials, H. E. Bennett . . . . . 480
Laser-Induced Breakdown in Optical Materials, W. Lee Smith . . . . . 489
Vacuum Ultraviolet (VUV) and Soft X-Ray Mirrors for Synchrotron Radiation, Victor Rehn, Vernon O. Jones . . . . . 504
Internal Reflection Spectroscopy Studies of Thin Films & Surfaces, E. D. Palik, R. T. Holm . . . . . 512
Measurement of Very Low Optical Absorption Coefficients in Bulk Materials, Marvin Hass . . . . . 525
Materials & Their Properties as They Apply to Electroabsorptive Devices, N. Bottka. . . 530
Optical Determination of Thermodynamic Phase Diagram of Metamagnet, William C. Egbert 539
Measurements of Ultrasmall Displacements, S. F. Jacobs . . . . . 544
Space Qualification of Optical Instruments Using the NASA Long Duration Exposure Facility, Lenwood G. Clark, John D. DiBattista . . 547
Stereoscopic Images with Gamma Ray Cameras, John A. McIntyre . . . . . 553
Do-It-Yourself Ruby Laser, B. P. Hildebrand, E. V. Allen. . . . . 561

**Volume 17, No. 6, November/December 1978**

Precision Machining of Optics (Guest Editorial), Theodore T. Saito. . . . . 569
Diamond Turning of Optics: Past, Present, Exciting Future, Theodore T. Saito . . . . . 570
Diamond Turning at a Large Optical Manufacturer, R. J. Benjamin . . . . . 574
Ion Polishing as a Surface Preparation for Dielectric Coating of Diamond-Turned Optics, R. A. Hoffman, W. J. Lange, J. G. Gowan, C. J. Miglionico . . . . . 578
Evaluation of Single-Point Diamond-Turned Copper Mirrors for the Los Alamos Scientific Laboratory Eight-Beam $CO_2$ Laser: Helios, J. E. Sollid, R. E. Sladky . . . . . 586
Fabrication of Off-Axis Parabolic Mirrors, H. L. Gerth, R. E. Sladky, M. J. Bezik, C. A. Washington . . . . . 588
Polishing Single-Point Diamond-Turned Metal Reflective Optics, P.C.Baker, N.J.Brown . 595
Computationally Directed Axisymmetric Aspheric Figuring, Norman J. Brown . . . 602
Diamond Turning of F-111 Windscreens: Feasibility Study Phase 1, Theodore T. Saito,

J. Taboada, B. R. Altschuler . . . . . 621
Optical System for an Automatic Eye Refractor, C. R. Munnerlyn . . . . . 627
Development of a Brewster's Angle Spectrophotometer, William E. Goetz, Ralph N. Jackson . . . . . 631
Statistical Analysis for Binary Image Correlator in Absence of Geometric Distortion, Lewis J. Pinson, Joseph S. Boland III, William W. Malcolm . . . . . 635
Advances in Microchannel Plate Technology & Applications, Adolph R. Asam . . . . . 640
Piezoelectric Inchworm Operation in a Vacuum, A. W. Hartman . . . . . 645
Scattering from Infrared Missile Domes, P. C. Archibald, H. E. Bennett . . . . . 647
Digital Video Image Processor for Real-Time X-Ray Subtraction Imaging, R. A. Kruger, C. A. Mistretta, J. Lancaster, T. L. Houk, M. Goodsitt, C. G. Shaw, S. J. Riederer, J. Hicks, J. Sackett, A. B. Crummy, D. Fleming . . 652
Large Size Lightweight Scanning Mirror, Gerald D. Ferguson . . . . . 658
Enhancement of Solar Corona & Comet Details, Walter Matuska Jr., D. H. Janney, J. A. Farrell, C. F. Keller Jr.. . . . . 661
Quaternary Alloy Infrared Heterojunction Detectors, A. R. Clawson, W. Y. Lum, H. H. Wieder . . . . . 666

## 1978 Author Index Optical Engineering Volume 17

Abel, Irving R., 5
Allen, E. V., 561
Alphonse, G. A., 308
Altschuler, B. R., 621
Amenson, Jerry L., 422
Anderson, Richard D., 94
Archibald, P. C., 647
Armstrong, Scott A., 273
Asam, Adolph R., 640
Azzam, R. M. A., 180

Bailey, Wade H., Jr., 407
Baker, P. C., 595
Ballik, E. A., 56
Banas, Conrad M., 210
Bartolini, R. A., 446
Bashara, N. M., 180
Bell, Irving J., 416
Bell, Steven V., 167
Benjamin, R. J., 574
Bennett, H. E., 160, 480, 647
Bennett, J. M., 160
Berg, N. J., 280
Berluti, V., 135
Berry, Joseph K., 143
Bezik, M. J., 588
Bleha, W. P., 371
Bloem, Harold H., 432
Bloom, Allen, 446
Bloss, Werner H., 69
Boland, Joseph S. III, 635
Bottka, N., 530
Breckinridge, J. B., 156
Bressel, C. N., 153
Brown, H. B., 371
Brown, Norman J., 595, 602
Buhl, David, 50
Burgess, Arthur E., 400
Burgess, E. L., 299
Burke, W. J., 308
Busch, G. E., 82

Caimi, Frank, 327
Carney, J. A., 301
Casasent, David, 307, 344, 365, 371
Chang, B. J., 334
Clark, Lenwood G., 547
Clawson, A. R., 666
Colburn, W. S., 334
Cole, Robert E., 411
Collis, R. T. H., 23
Corbett, Francis J., 353
Crosby, G. A., 176
Crow, T. G., 120
Crummy, A. B., 652

Decker, D. L., 160
DiBattista, John D., 547
Dickey, Fred M., 295
Doi, Kunio, 386
Drozewski, Richard W., 14

Egbert, William C., 539
Emming, J. G., 63
Engel, Simon L., 235
Esplin, Roy W., 73
Eynon, J. U., 125

Farrell, J. A., 661
Feldman, Albert, 453
Ferguson, Gerald D., 658
Fleming, D., 652
Frazier, Gene F., 225
Fujii, Yoichi, 147

Garside, B. K., 56
Geary, Joseph M., 185
Genant, Harry K., 386
George, E. V., 238
Gerth, H. L., 588
Glass, A. M., 470
Goetz, William E., 432, 631
Goldberg, R. A., 63
Goodsitt, M., 652
Grimes, Gary J., 425
Grinberg, J., 371
Grojean, Richard E., 139

Hake, R. D., 23
Hallam, K. L., 63
Harder, T. Mark, 295
Hartman, A. W., 645
Hass, Marvin, 525
Hatch, Marcus R., 14
Heimes, Frederick J., 143
Hella, Richard A., 198
Hendee, William R., 385
Hicks, J., 652
Hildebrand, B. P., 561
Hine, Derek L., 232
Hipps, K. W., 176
Hoffman, R. A., 578
Holm, R. T., 512
Honebrink, R. W., 252
Horwitz, Bruce A., 353
Houk, T. L., 652
Humphrey, Keith, 400
Huppert, D., 82

Ishimaru, Akira, 129

Jackson, Ralph N., 631
Jacobs, S. F., 544
Janney, D. H., 661
Johnson, L. H., 252
Jones, Vernon O., 504
Joseph, Peter M., 396

Keck, Donald B., 114
Keller, C. F., Jr., 661
Kogan, R. M., 120
Kolb, W. P., 125
Kostiuk, Theodor, 50
Krauss, Robert J., 6
Krishnan, Kamala S., 108
Kruger, R. A., 652
Krupke, W. F., 238
Krystich, Michael, 416
Kundel, Harold L., 393
Kuttner, Paul, 90

Lancaster, J., 652
Land, C. E., 317
Lange, W. J., 578
Lee, J. N., 280
Leith, E. N., 301
Lipton, L. T., 371
Lo, D. S., 252
Locke, Edward V., 192
Love, Roy E., 114
Lum, W. Y., 666

Malcolm, William W., 635
Mankin, William G., 39
Marchi, D. L., 299
Markevitch, B. V., 371
Marks, Robert J. II, 167
Masamura, Tatsuro, 147
Massey, G. A., 247
Matuska, Walter J., 661
McIntyre, John A., 553
Menzies, Robert T., 44
Merritt, John O., 411
Milam, D., 463
Mistretta, C. A., 652
Mumma, Michael J., 50
Munnerlyn, C. R., 627
Muntz, E. P., 390
Murray, Edward R., 30, 186

Nakashima, Masato, 139
Ng, W. R., 301
Nisenson, Peter, 256

Oakes, Martin, 217
Oliver, Donald S., 288
Ostrem, John S., 108

Palik, E. D., 512
Pellegrino, A. J., 135
Pepper, Ross L., 411
Phillips, W., 308
Pinson, Lewis J., 635
Pixton, R. M., 120
Porteus, J. O., 160
Potter, Roy F., 445

Ramsey, I. A., 125
Ready, John F., 191
Rehn, Victor, 504
Reid, J., 56
Reif, P. G., 371
Reinhardt, Erich R., 69
Rentzepis, P. M., 82
Riederer, S. J., 652
Roach, Joseph F., 139
Rosauer, Elmer A., 422
Russell, P. B., 23

Sackett, J., 652
Saito, Theodore T., 569, 570, 621
Shanmuganathan, K., 247
Shapiro, J. S., 135
Shaw, C. G., 652
Sherman, Glenn H., 225
Shewchun, J., 56
Shimizu, Koichi, 129
Sickles, Edward A., 386
Sladky, R. E., 586, 588
Smith, David C., 411
Smith, James A., 143
Smith, Michael R., 416
Smith, W. Lee, 463, 489
Soileau, M. J., 160
Sollid, J. E., 586
Sousa, John A., 139
Sprague, Robert A., 256
Staebler, D. L., 308

Taboada, J., 621
Teich, Malvin Carl, 170
Thompson, Brian J., 273

Udelson, B. J., 280
Upatnieks, J., 301
Vander Velde, W. E., 153

Walter, Helmut, 299
Wang, Victor, 267
Washington, C. A., 588
Weakliem, H. A., 446
Weber, M. J., 463
Wieder, H. H., 666
Wiener-Avnear, E., 371
Wisotsky, S. R., 153
Wyner, Elliot F., 139

Yessik, Michael J., 202
Zaghloul, A. R. M., 180

## 1978 Subject Index Optical Engineering Volume 17

Absence of geometric distortion, statistical analysis for binary image correlator in the, 635
Absorption coefficients in bulk materials, measurement of very low optical, 525
Acousto-optic memory correlator, long-duration, 280
Advanced lasers for fusion applications, 238
Advances in microchannel plate technology and applications, 640
Airborne Fourier transform spectroscopy of the upper atmosphere, 39
Alignment, shearing plate optical, 295
Alkali-halides as optical processing elements, photodichroic, 327
Alloy infrared heterojunction detectors, quaternary, 666
Ambient concentrations of atmospheric gases using tunable lasers, point monitoring of, 56
Amplitude interferometer with 180-degree rotational shear, white-light, 156
Analog fiber optics data communications system, high resolution, 425
Analysis, astigmatic coherent processor, 167
Analysis of bacteria, scattering pattern, 129
Analysis for a binary image correlator in absence of geometric distortion, statistical, 635
Analysis techniques in image evaluation, comparison of coherent and incoherent optical spectrum, 273
Analytical spectroscopy using a continuously scanned tunable dye laser, detection of atmospheric pollutants by quantitative, 147
Angiography, visual perception limits in, 400
Angle spectrophotometer, development of a Brewster's, 631
Aperture condensing lenses, rainbow holograms using large-, 301
Applications of Dynalyzer II to x-ray quality control, 135
Application to inorganic complexes, magnetically induced circular polarization of emission:, 176
Application of liquid crystal light valve to real-time optical data processing, 371
Applications, advanced lasers for fusion, 238

Applications, advances in microchannel plate technology and, 640
Applications, high power CW $CO_2$ lasers and their, 192
Applications of high power laser, industrial, 191
Applications for Pockels Readout Optical Modulator, the PROM—theory and, 353
Aspheric figuring, computationally directed axisymmetric, 602
Assessment, review of German standards on image, 90
Astigmatic coherent processor analysis, 167
Atmosphere, airborne Fourier transform spectroscopy of the upper, 39
Atmospheric gases using tunable lasers, point monitoring of ambient concentrations of, 56
Atmospheric measurement, sensors for, 5
Atmospheric monitoring using heterodyne detection techniques, 44
Atmospheric pollutants by quantitative analytical spectroscopy using continuously scanned tunable dye laser, detection of, 147
Aurorae from Spacelab, imaging of x-ray, 63
Automatic eye refractor, optical system for, 627
Axis parabolic mirrors, fabrication of off-, 588
Axisymmetric aspheric figuring, computationally directed, 602

Bacteria, scattering pattern analysis of, 129
Binary image correlator in absence of geometric distortion, statistical analysis for, 635
Breakdown in optical materials, laser-induced, 489
Brewster's angle spectrophotometer, development of a, 631
Bulk materials, measurement of very low optical absorption coefficients in, 525

$CO_2$ laser: Helios, evaluation of single-point diamond-turned copper mirrors for Los Alamos Scientific Laboratory, eight-beam, 586
$CO_2$ lasers and their applications, high power CW, 192
$CO_2$ lasers: practical considerations, transmissive optics for high power, 225
CW $CO_2$ lasers and their applications, high power, 192
Camera system: geostationary meteorological satellite workhorse for a decade, 6
Cameras, stereoscopic images with gamma ray, 553
Can diagnostic examinations be effectively modeled?, 390
Cells, novel square Fresnel lens design for illuminating circular solar, 299
Ceramics, optical information storage and spatial light modulation in PLZT, 317
Characteristics of optical fiber waveguides, 114
Characteristics of optical materials, scattering, 480
Circular polarization of emission: application to inorganic complexes, magnetically induced, 176
Circular solar cells, novel square Fresnel lens design for illuminating, 299
Clinical evaluations of image properties of mammographic screen-film systems, laboratory and controlled, 386
Coating of diamond-turned optics, ion polishing as surface preparation for dielectric, 578
Coefficients in bulk materials, measurement of very low optical absorption, 525
Coherent and incoherent optical spectrum analysis techniques in image evaluation, comparison of, 273
Coherent processor analysis, astigmatic, 167
Comet details, enhancement of solar corona, 661
Communications system, high resolution analog fiber optics data, 425
Comparison of coherent and incoherent optical spectrum analysis techniques in image evaluation, 273
Complexes, magnetically induced circular polarization of emission: application to inorganic, 176
Computationally directed axisymmetric aspheric figuring, 602
Computed tomography scanners, image noise and smoothing in, 396
Concentrations of atmospheric gases using tunable lasers, point monitoring of ambient, 56
Condensing lenses, rainbow holograms using large-aperture, 301
Conjugation for laser systems, nonlinear optical phase, 267
Continuously scanned tunable dye laser, detection of atmospheric pollutants by quantitative analytical spectroscopy using a, 147
Control, application of Dynalyzer II to x-ray quality, 135
Controlled clinical evaluations of image properties of mammographic screen-film systems, laboratory and, 386
Conventional or stereo video displays, operator performance using, 411
Copper mirrors for Los Alamos Scientific Laboratory eight-beam $CO_2$ laser: Helios, evaluation of single-point diamond-turned, 586
Corona and comet details, enhancement of solar, 661
Correlation radiometry, heterodyne, 170
Correlator in absence of geometric distortion, statistical analysis for binary image, 635
Correlator, long-duration acousto-optic memory, 280
Crystal light valve to real-time optical data processing, application of liquid, 371
Crystals, nonlinear refractive index of glasses and, 463
Crystals, volume phase holographic storage in ferroelectric, 308

DKDP light valve:a review, photo, 365
DKDP light valves, E-beam, 344
Data communications system, high resolution analog fiber optics, 425
Data processing, application of liquid crystal light valve to real-time optical, 371
Data storage and display, electro-optical thin films for, 416
Decay times, use of fast Fourier transform in evaluation of laser Raman and fluorescence, 153
Design for illuminating circular solar cells, novel square Fresnel lens, 299
Design, star simulator, 432
Detection of atmospheric pollutants by quantitative analytical spectroscopy using continuously scanned tunable dye laser, 147
Detection techniques, atmospheric monitoring using heterodyne, 44
Detection of trace gases, 10 $\mu$m laser heterodyne spectrometer for remote, 50
Detectors, quaternary alloy infrared heterojunction, 666
Determination of thermodynamic phase diagram of a metamagnet, optical, 539
Development of a Brewster's angle spectrophotometer, 631
Devices, materials and their properties as they apply to electroabsorptive, 530
Devices, organic materials for optical, 446
Diagnostic examinations be effectively modeled?, can, 390
Diagram of metamagnet, optical determination of thermodynamic phase, 539
Diamond-turned copper mirrors for Los Alamos Scientific Laboratory eight-beam $CO_2$ laser: Helios, evaluation of single-point, 586
Diamond-turned and other metal mirrors, surface and optical studies of, 160
Diamond-turned metal reflective optics, polishing single-point, 595
Diamond-turned optics, ion polishing as surface preparation for dielectric coating of, 578
Diamond turning of F-111 windscreens: feasibility study phase 1, 621
Diamond turning at large optical manufacturer, 574
Diamond turning of optics: past, present, exciting future, 570

Dielectric coating of diamond-turned optics, ion polishing as surface preparation for, 578
Differential-absorption lidar, remote measurement of gases using, 30; errata 186
Differential operation processor, optical, 69
Digital processing systems, real-time spatial modulators for optical/, 288
Digital video image processor for real-time x-ray subtraction imaging, 652
Directed axisymmetric aspheric figuring, computationally, 602
Displacements, measurements of ultrasmall, 544
Display, electro-optical thin films for data storage and, 416
Displays, operator performance using conventional or stereo video, 411
Distortion, statistical analysis for binary image correlator in absence of geometric, 635
Do-it-yourself ruby laser, 561
Domes, scattering from infrared missile, 647
Doubling of Nd:YAG, high-efficiency frequency, 120
Dye laser, detection of atmospheric pollutants by quantitative analytical spectroscopy using continuously scanned tunable, 147
Dynalyzer II to x-ray quality control, application of, 135

E-beam DKDP Light Valves, 344
Effect, the photorefractive, 470
Eight-beam $CO_2$ laser: Helios, evaluation of single-point diamond-turned copper mirrors for Los Alamos Scientific Laboratory, 586
Electroabsorptive Devices, materials and their properties as they apply to, 530
Electron microscope (SEM) positive print photography, scanning, 422
Electro-optical thin films for data storage and display, 416
Emission: application to inorganic complexes, magnetically induced circular polarization of, 176
Engineering, laser, 107; errata 439
Enhancement of solar corona and comet details, 661
Evaluation, comparison of coherent and incoherent optical spectrum analysis techniques in image, 273
Evaluation of laser Raman and fluorescence decay times, use of fast Fourier transform in, 153
Evaluations of image properties of mammographic screen-film systems, laboratory and controlled clinical, 386
Evaluation of single-point diamond-turned copper mirrors for Los Alamos Scientific Laboratory Eight-Beam $CO_2$ laser: Helios, 586
Examinations be effectively modeled?, can diagnostic, 390
Experiment, Limb infrared monitor of stratosphere (LIMS), 14
Exposure facility, space qualification of optical instruments using NASA long-duration, 547
Eye refractor, optical system for automatic, 627

F-111 windscreens: feasibility study phase 1, diamond turning of, 621
Fabrication of off-axis parabolic mirrors, 588
Facility, space qualification of optical instruments using NASA long duration exposure, 547
Fast Fourier transform in evaluation of laser Raman and fluorescence decay times, use of the, 153
Feasibility study phase 1, diamond turning of F-111 windscreens:, 621
Ferroelectric crystals, volume phase holographic storage in, 308
Fiber optics data communications system, high resolution analog, 425
Fiber waveguides, characteristics of optical, 114
Figuring, computationally directed axisymmetric aspheric, 602
Film resistor trimming by laser, introduction to thick, 217
Film-substrate single-reflection retarders for different mercury spectral lines, $SiO_2$-Si, 180
Film systems, laboratory and controlled clinical

evaluations of image properties of mammographic screen-, 386
Films for data storage and display, electro-optical thin, 416
Films and surfaces, internal reflection spectroscopy studies of thin, 512
Flare light in microdensitometers, simple model of, errata, 185
Fluorescence decay times, use of fast Fourier transform in evaluation of laser Raman &, 153
Fourier transform in evaluation of laser Raman and fluorescence decay times, use of fast, 153
Fourier transform spectroscopy of upper atmosphere, airborne, 39
Frequency doubling of Nd:YAG, high-efficiciency, 120
Fresnel lens design for illuminating circular solar cells, novel square, 299
Fusion applications, advanced lasers for, 238

Gamma ray cameras, stereoscopic images with, 553
Gases, 10 μm laser heterodyne spectrometer for remote detection of trace, 50
Gases using differential-absorption lidar, remote measurement of, 30
Gases using tunable lasers, point monitoring of ambient concentrations of atmospheric, 56
Geometric distortion, statistical analysis for a binary image correlator in absence of, 635
Geostationary meteorological satellite workhorse for a decade, spin-scan camera system, 6
German standards on image assessment, review of, 90
Glasses and crystals, nonlinear refractive index of, 463

HeNe lasers, manufacturing low noise, 125
Halides as optical processing elements, photodichroic alkali-, 327
Helios, evaluation of single-point diamond-turned copper mirrors for Los Alamos Scientific Laboratory eight-beam $CO_2$ laser:, 586
Heterodyne correlation radiometry, 170
Heterodyne detection techniques, atmospheric monitoring using, 44
Heterodyne spectrometer for remote detection of trace gases, 10 μm laser, 50
Heterojunction detectors, quaternary alloy infrared, 666
High-efficiency frequency doubling of Nd:YAG, 120
High power $CO_2$ lasers: practical considerations, transmissive optics for, 225
High power CW $CO_2$ lasers and their applications, 192
High power laser, industrial applications of, 191
High power laser welding, 210
High power lasers, material processing with, 198
High resolution analog fiber optics data communications system, 425
Holograms using large-aperture condensing lenses, rainbow, 301
Holographic storage in ferroelectric crystals, volume phase, 308

Illuminating circular solar cells, novel square Fresnel lens design for, 299
Image assessment, review of German standards on, 90
Image correlator in absence of geometric distortion, statistical analysis for binary, 635
Image evaluation, comparison of coherent and incoherent optical spectrum analysis techniques in, 273
Image noise and smoothing in computed tomography scanners, 396
Image processor for real-time x-ray subtraction imaging, digital video, 652
Image properties of mammographic screen-film systems, laboratory and controlled clinical evaluations of, 386
Image properties, radiologic decision making and physical, 393
Image transducer, photoconductor-thermoplastic, 334
Images with gamma ray cameras, stereoscopic, 553
Imaging, digital video image processor for real-time x-ray subtraction, 652
Imaging, medical, 385
Imaging using nonlinear optical upconversion, infrared, 108
Imaging of x-ray aurorae from Spacelab, 63
Inchworm operation in a vacuum, piezoelectric, 645
Incoherent optical spectrum analysis techniques in image evaluation, comparison of coherent and, 273
Index of glasses and crystals, nonlinear refractive, 463
Industrial applications of high power laser, 191
Industrial laser and work handler systems integration, 232
Information storage and spatial light modulation in PLZT ceramics, optical, 317
Infrared heterojunction detectors, quaternary alloy, 666
Infrared imaging using nonlinear optical upconversion, 108
Infrared missile domes, scattering from, 647
Infrared monitor of stratosphere (LIMS) experiment, limb, 14
Inorganic complexes, magnetically induced circular polarization of emission: application to, 176
Instrument for simultaneous recording of scene composition and spectral reflectance, portable, 143
Instrumentation for propagation measurements, line spread, 407
Instruments using NASA long duration exposure facility, space qualification of optical, 547
Integration, industrial laser and work handler systems, 232
Interferometer with 180-degree rotational shear, white-light amplitude, 156
Interferometers for laser pulse shaping, nonlinear, 247
Interferometric spectrometer, selective modulation, 73
Internal reflection spectroscopy studies of thin films and surfaces, 512
Introduction to thick film resistor trimming by laser, 217
Ion polishing as surface preparation for dielectric coating of diamond-turned optics, 578

Job shopping using today's laser technology, laser, 235

LIMS experiment, limb infrared monitor of the stratosphere, 14
Laboratory and controlled clinical evaluations of image properties of mammographic screen-film systems, 386
Large-aperture condensing lenses, rainbow holograms using, 301
Large size lightweight scanning mirror, 658
Laser, detection of atmospheric pollutants by quantitative analytical spectroscopy using a continuously scanned tunable dye, 147
Laser, do-it-yourself ruby, 561
Laser engineering, 107; errata 439
Laser: Helios, evaluation of single-point diamond-turned copper mirrors for Los Alamos Scientific Laboratory eight-beam $CO_2$, 586
Laser heterodyne spectrometer for remote detection of trace gases, 10 μm, 50
Laser-induced breakdown in optical materials, 489
Laser-induced luminescence techniques, remote pollution probing by, 139
Laser, industrial applications of high power, 191
Laser, introduction to thick film resistor trimming by, 217
Laser job shopping using today's laser technology, 235
Laser material processing, 202
Laser pulse shaping, nonlinear interferometers for, 247
Laser Raman and fluorescence decay times, use of fast Fourier transform in evaluation of, 153
Laser systems, nonlinear optical phase conjugation for, 267
Laser technology, laser job shopping using today's, 235
Laser welding, high power, 210
Laser and work handler systems integration, industrial, 232
Lasers and their applications, high power CW $CO_2$, 192
Lasers for fusion applications, advanced, 238
Lasers, manufacturing low noise HeNe, 125
Lasers, material processing with high power, 198
Lasers, point monitoring of ambient concentrations of atmospheric gases using tunable, 56
Lasers: practical considerations, transmissive optics for high power $CO_2$, 225
Lens design for illuminating circular solar cells, novel square Fresnel, 299
Lenses, rainbow holograms using large-aperture condensing, 301
Lidar, remote measurement of gases using differential-absorption lidar, 30; errata 186
Lidar in space, 23
Light amplitude interferometer with 180-degree rotational shear, white-, 156
Light in microdensitometers, simple model of flare, errata 185
Light modulation in PLZT ceramics, optical information storage and spatial, 317
Light modulators, spatial, 307
Light valve to real-time optical data processing, application of liquid crystal, 371
Light valve: a review, photo DKDP, 365
Light valves, E-beam DKDP, 344
Lightweight scanning mirror, large size, 658
Limb infrared monitor of stratosphere (LIMS) experiment, 14
Limits in angiography, visual perception, 400
Line spread instrumentation for propagation measurements, 407
lines, $SiO_2$-Si film-substrate single-reflection retarders for different mercury spectral, 180
Liquid crystal light valve to real-time optical data processing, application of the, 371
Long-duration acousto-optic memory correlator, 280
Long-duration exposure facility, space qualification of optical instruments using NASA, 547
Los Alamos Scientific Laboratory eight-beam $CO_2$ laser: Helios, evaluation of single-point diamond-turned copper mirrors for, 586
Low noise HeNe lasers, manufacturing, 125
Low optical absorption coefficients in bulk materials, measurement of very, 525
Luminenscence techniques, remote pollution probing by laser-induced, 139

Machining of optics, precision, 569
Magnetically induced circular polarization of emission: application to inorganic complexes, 176
Mammographic screen-film systems, laboratory and controlled clinical evaluations of image properties of, 386
Manufacturer, diamond turning at large optical, 574
Manufacturing low noise HeNe lasers, 125
Material processing with high power lasers, 198
Material processing, laser, 202
Materials, laser-induced breakdown in optical, 489
Materials, measurement of photo-elastic contents of optical, 453
Materials, measurement of very low optical absorption coefficients in bulk, 525
Materials for optical devices, organic, 446
Materials, optical properties of optical, 445
Materials and their properties as they apply to electroabsorptive devices, 530
Materials, scattering characteristics of optical, 480
Measurement of gases using differential-absorption lidar, remote, 30; errata 186
Measurement of photoelastic contents of optical materials, 453
Measurement, sensors for atmospheric, 5
Measurement of very low optical absorption coefficients in bulk materials, 525

Measurements, line spread instrumentation for propagation, 407
Measurements of ultrasmall displacements, 544
Medical imaging, 385
Memory correlator, long-duration acousto-optic, 280
Mercury spectral lines, $SiO_2$-Si film-substrate single-reflection retarders for different, 180
Metal mirrors, surface and optical studies of diamond-turned and other, 160
Metal reflective optics, polishing single-point diamond-turned, 595
Metamagnet, optical determination of thermodynamic phase diagram of a, 539
Meteorological satellite workhorse for a decade, spin-scan camera system: geostationary, 6
Microchannel plate technology and applications, advances in, 640
Microdensitometers, simple model of flare light in, errata 185
Microscope (SEM) positive print photography, scanning electron, 422
Mirror, large size lightweight scanning, 658
Mirrors, fabrication of off-axis parabolic, 588
Mirrors for Los Alamos Scientific Laboratory eight-beam $CO_2$ laser: Helios, evaluation of single-point diamond-turned copper, 586
Mirrors, surface and optical studies of diamond-turned and other metal, 160
Mirrors for synchrotron radiation, vacuum ultraviolet (VUV) and soft x-ray, 504
Missile domes, scattering from infrared, 647
Model of flare light in microdensitometers, simple, errata 185
Modeled?, can diagnostic examinations be effectively, 390
Modulation interferometric spectrometer, selective, 73
Modulation in PLZT ceramics, optical information storage and spatial light, 317
Modulator, the PROM: theory and applications for the Pockels Readout optical, 353
Modulators for optical/digital processing systems, real-time spatial, 288
Modulators, spatial light, 307
Monitor of stratosphere (LIMS) experiment, limb infrared, 14
Monitoring of ambient concentrations of atmospheric gases using tunable lasers, point, 56
Monitoring using heterodyne detection techniques, atmospheric, 44

NASA long-duration exposure facility, space qualification of optical instruments using, 547
Nd:YAG, high-efficiency frequency doubling of, 120
Noise HeNe lasers, manufacturing low, 125
Noise and smoothing in computed tomography scanners, image, 396
Nonlinear interferometers for laser pulse shaping, 247
Nonlinear optical phase conjugation for laser systems, 267
Nonlinear optical upconversion, infrared imaging using, 108
Nonlinear refractive index of glasses and crystals, 463
Novel square Fresnel lens design for illuminating circular solar cells, 299

Off-axis parabolic mirrors, fabrication of, 588
180-degree rotational shear, white-light amplitude interferometer with, 156
Operation processor, optical differential, 69
Operation in a vacuum, piezoelectric inchworm, 645
Operator performance using conventional or stereo video displays, 411
Optic memory correlator, long-duration acousto-, 280
Optical absorption coefficients in bulk materials, measurement of very low, 525
Optical alignment, shearing plate, 295
Optical data processing, application of liquid crystal light valve to real-time, 371
Optical determination of thermodynamic phase diagram of a metamagnet, 539
Optical devices, organic materials for, 446
Optical differential operation processor, 69
Optical/digital processing systems, real-time spatial modulators for, 288
Optical fiber waveguides, characteristics of, 114
Optical information storage and spatial light modulation in PLZT ceramics, 317
Optical instruments using NASA long-duration exposure facility, space qualification of, 547
Optical manufacturer, diamond turning at a large, 574
Optical materials, laser-induced breakdown in, 489
Optical materials, measurement of photoelastic contents of, 453
Optical materials, optical properties of, 445
Optical materials, scattering characteristics of, 480
Optical modulator, PROM: theory and applications for the Pockels readout, 353
Optical phase conjugation for laser systems, nonlinear, 267
Optical picosecond spectroscopy, 82
Optical processing elements, photodichroic alkali-halides as, 327
Optical properties of optical materials, 445
Optical spectrum analysis techniques in image evaluation, comparison of coherent and incoherent, 273
Optical studies of diamond-turned and other metal mirrors, surface and, 160
Optical system for automatic eye refractor, 627
Optical thin films for data storage and display, electro-, 416
Optical upconversion, infrared imaging using nonlinear, 108
Optics data communications system, high resolution analog fiber, 425
Optics for high power $CO_2$ lasers: practical considerations, transmissive, 225
Optics, ion polishing as surface preparation for dielectric coating of diamond-turned, 578
Optics: past, present, exciting future, diamond turning of, 570
Optics, polishing single-point diamond-turned metal reflective, 595
Optics, precision machining of, 569
Organic materials for optical devices, 446

PLZT ceramics, optical information storage and spatial light modulation in, 317
PROM: a status report, 256
PROM: theory and applications for the Pockels readout optical modulator, 353
Parabolic mirrors, fabrication of off-axis, 588
Pattern analysis of bacteria, scattering, 129
Perception limits in angiography, visual, 400
Performance using conventional or stereo video displays, operator, 411
Phase conjugation for laser systems, nonlinear optical, 267
Phase diagram of a metamagnet, optical determination of thermodynamic, 539
Phase holographic storage in ferroelectric crystals, volume, 308
Phase 1, diamond turning of F-111 windscreens: feasibility study, 621
Photo DKDP light valve: a review, 365
Photoconductor-thermoplastic image transducer, 334
Photodichroic alkali-halides as optical processing elements, 327
Photoelastic contents of optical materials, measurement of, 453
Photography, scanning electron microscope (SEM) positive print, 422
Photorefractive effect, the, 470
Physical image properties, radiologic decision making and, 393
Picosecond spectroscopy, optical, 82
Piezoelectric inchworm operation in a vacuum, 645
Plate optical alignment, shearing, 295
Plate technology and applications, advances in microchannel, 640
Pockels readout optical modulator, the PROM: theory and applications for the, 353
Point monitoring of ambient concentrations of atmospheric gases using tunable lasers, 56
Polarization of emission: application to inorganic complexes, magnetically induced circular, 176
Polishing single-point diamond-turned metal reflective optics, 595
Polishing as surface preparation for dielectric coating of diamond-turned optics, ion, 578
Pollutants by quantitative analytical spectroscopy using continuously scanned tunable dye laser, detection of atmospheric, 147
Pollution probing by laser-induced luminescence techniques, remote, 139
Portable instrument for simultaneous recording of scene composition and spectral reflectance, 143
Positive print photography, scanning electron microscope (SEM), 422
Precision machining of optics, 569
Preparation for dielectric coating of diamond-turned optics, ion polishing as surface, 578
Probing by laser-induced luminescence techniques, remote pollution, 139
Processing, application of liquid crystal light valve to real-time optical data, 371
Processing elements, photodichroic alkali-halides as optical, 327
Processing with high power lasers, material, 198
Processing, laser material, 202
Processing systems, real-time spatial modulators for optical/digital, 288
Processor analysis, astigmatic coherent, 167
Processor, optical differential operation, 69
Processor for real-time x-ray subtraction imaging, digital video image, 652
Propagation measurements, line spread instrumentation for, 407
Properties of mammographic screen-film systems, laboratory and controlled clinical evaluations of image, 386
Properties of optical materials, optical, 445
Properties, radiologic decision making and physical image, 393
Pulse shaping, nonlinear interferometers for laser, 247
Qualification of optical instruments using NASA long-duration exposure facility, space, 547
Quality control, application of Dynalyzer II to x-ray, 135
Quantitative analytical spectroscopy using continuously scanned tunable dye laser, detection of atmospheric pollutants by, 147
Quaternary alloy infrared heterojunction detectors, 666

Radiance scanner, underwater, 94
Radiation, vacuum ultraviolet (VUV) and soft x-ray mirrors for synchrotron, 504
Radiologic decision making and physical image properties, 393
Radiometry, heterodyne correlation, 170
Rainbow holograms using large-aperture condensing lenses, 301
Raman and fluorescence decay times, use of fast Fourier transform in evaluation of laser, 153
Readout optical modulator, the PROM: theory and applications for the Pockels, 353
Real-time optical data processing, application of liquid crystal light valve to, 371
Real-time spatial modulators for optical/digital processing systems, 288
Real-time x-ray subtraction imaging, digital video image processor for, 652
Recording of scene composition and spectral reflectance, portable instrument for simultaneous, 143
Recording, thermoplastic, 252
Reflectance, portable instrument for simultaneous recording of scene composition and spectral, 143
Reflection retarders for different mercury spectral lines, $SiO_2$-Si film-substrate single-, 180
Reflection spectroscopy studies of thin films and surfaces, internal, 512

Reflective optics, polishing single-point diamond-turned metal, 595
Refractive index of glasses and crystals, nonlinear, 463
Refractor, optical system for automatic eye, 627
Remote detection of trace gases, 10 μm laser heterodyne spectrometer for, 50
Remote measurement of gases using differential-absorption lidar, 30; errata 186
Remote pollution probing by laser-induced luminescence techniques, 139
Resistor trimming by laser, introduction to thick film, 217
Retarders for different mercury spectral lines, $SiO_2$-Si film-substrate single-reflection, 180
Review of German standards on image assessment, 90
Review, photo DKDP light valve, 365
Rotational shear, white-light amplitude interferometer with 180-degree, 156
Ruby laser, do-it-yourself, 561

SEM Positive print photography, scanning electron microscope, 422
$SiO_2$-Si film-substrate single-reflection retarders for different mercury spectral lines, 180
Satellite workhorse for a decade, spin-scan camera system: geostationary meteorological, 6
Scan camera system: geostationary meteorological satellite workhorse for a decade, spin-, 6
Scanned tunable dye laser, detection of atmospheric pollutants by quantitative analytical spectroscopy using a continuously, 147
Scanner, underwater radiance, 94
Scanners, image noise and smoothing in computed tomography (CT), 396
Scanning electron microscope (SEM) positive print photography, 422
Scanning mirror, large size lightweight, 658
Scattering characteristics of optical materials, 480
Scattering from infrared missile domes, 647
Scattering pattern analysis of bacteria, 129
Scene composition and spectral reflectance, portable instrument for simultaneous recording of, 143
Screen-film systems, laboratory and controlled clinical evaluations of image properties of mammographic, 386
Selective modulation interferometric spectrometer, 73
Sensors for atmospheric measurement, 5
Shear, white-light amplitude interferometer with 180-degree rotational, 156
Shearing plate optical alignment, 295
Simple model of flare light in microdensitometers, errata 185
Simulator design, star, 432
Simultaneous recording of scene composition and spectral reflectance, portable instrument for, 143
Single-point diamond-turned copper mirrors for Los Alamos Scientific Laboratory eight-beam $CO_2$ laser: Helios, evaluation of, 586
Single-point diamond-turned metal reflective optics, polishing, 595
Single-reflection retarders for different mercury spectral lines, $SiO_2$-Si film-substrate, 180
Smoothing in computed tomography (CT) scanners, image noise and, 396
Soft x-ray mirrors for synchrotron radiation, vacuum ultraviolet (VUV) and, 504
Solar cells, novel square Fresnel lens design for illuminating circular, 299
Solar corona and comet details, enhancement of, 661
Space, lidar in, 23
Space qualification of optical instruments using NASA long-duration exposure facility, 547
Spacelab, imaging of x-ray aurorae from, 63
Spatial light modulation in PLZT ceramics, optical information storage and, 317
Spatial light modulators, 307
Spatial modulators for optical/digital processing systems, real-time, 288
Spectral lines, $SiO_2$-Si film-substrate single-reflection retarders for different mercury, 180
Spectral reflectance, portable instrument for simultaneous recording of scene composition and, 143
Spectrometer for remote detection of trace gases, 10 μm laser heterodyne, 50
Spectrometer, selective modulation interferometric, 73
Spectrophotometer, development of a Brewster's angle, 631
Spectroscopy, optical picosecond, 82
Spectroscopy studies of thin films and surfaces, internal reflection, 512
Spectroscopy of upper atmosphere, airborne Fourier transform, 39
Spectroscopy using continuously scanned tunable dye laser, detection of atmospheric pollutants by quantitative analytical, 147
Spectrum analysis techniques in image evaluation, comparison of coherent and incoherent optical, 273
Spin-scan camera system: geostationary meteorological satellite workhorse for a decade, 6
Square Fresnel lens design for illuminating circular solar cells, novel, 299
Standards on image assessment, review of German, 90
Star simulator design, 432
Statistical analysis for binary image correlator in absence of geometric distortion, 635
Status report, the PROM, 256
Stereo video displays, operator performance using conventional or, 411
Stereoscopic images with gamma ray cameras, 553
Storage and display, electro-optical thin films for data, 416
Storage in ferroelectric crystals, volume phase holographic, 308
Storage and spatial light modulation in PLZT ceramics, optical information, 317
Stratosphere (LIMS) experiment, limb infrared monitor of the, 14
Study phase 1, diamond turning of F-111 windscreens: feasibility, 621
Studies of diamond-turned and other metal mirrors, surface and optical, 160
Studies of thin films and surfaces, internal reflection spectroscopy, 512
Substrate single-reflection retarders for different mercury spectral lines, $SiO_2$-Si film-, 180
Subtraction imaging, digital video image processor for real-time x-ray, 652
Surface and optical studies of diamond-turned and other metal mirrors, 160
Surface preparation for dielectric coating of diamond-turned optics, ion polishing as a, 578
Surfaces, internal reflection spectroscopy studies of thin films and, 512
Synchrotron radiation, vacuum ultraviolet (VUV) and soft x-ray mirrors for, 504
System for automatic eye refractor, optical, 627
System: geostationary meteorological satellite workhorse for a decade, spin-scan camera, 6
System, high resolution analog fiber optics data communications, 425
Systems integration, industrial laser and work handler, 232
Systems, laboratory and controlled clinical evaluations of image properties of mammographic screen-film, 386
Systems, nonlinear optical phase conjugation for laser, 267
Systems, real-time spatial modulators for optical/digital processing, 288

10 μm laser heterodyne spectrometer for remote detection of trace gases, 50
Techniques, atmospheric monitoring using heterodyne detection, 44
Techniques in image evaluation, comparison of coherent and incoherent optical spectrum analysis, 273
Techniques, remote pollution probing by laser-induced luminescence, 139
Technology & applications, advances in microchannel plate, 640
Technology, laser job shopping using today's laser, 235
Theory and application for Pockels readout optical modulator, the PROM:, 353
Thermodynamic phase diagram of a metamagnet, optical determination of, 539
Thermoplastic image transducer, photoconductor-, 334
Thermoplastic recording, 252
Thick film resistor trimming by laser, introduction to, 217
Thin films for data storage and display, electro-optical, 416
Thin films and surfaces, internal reflection spectroscopy studies of, 512
Times, use of fast Fourier transform in evaluation of laser Raman and fluorescence decay, 153
Tomography (CT) scanners, image noise and smoothing in computed, 396
Trace gases, 10 μm laser heterodyne spectrometer for remote detection of, 50
Transducer, photoconductor-thermoplastic image, 334
Transform spectroscopy of upper atmosphere, airborne Fourier, 39
Transmissive optics for high power $CO_2$ lasers: practical considerations, 225
Trimming by laser, introduction to thick film resistor, 217
Tunable dye laser, detection of atmospheric pollutants by quantitative analytical spectroscopy using continuously scanned, 147
Tunable lasers, point monitoring of ambient concentrations of atmospheric gases using, 56
Turning of F-111 windscreens: feasibility study phase 1, diamond, 621
Turning at large optical manufacturer, diamond 574
Turning of optics: past, present, exciting future, diamond, 570

Ultrasmall displacements, measurements of, 544
Ultraviolet (VUV) and soft x-ray mirrors for synchrotron radiation, vacuum, 504
Underwater radiance scanner, 94
Upconversion, infrared imaging using nonlinear optical, 108
Upper atmosphere, airborne Fourier transform spectroscopy of, 39
Use of fast Fourier transform in evaluation of laser Raman and fluorescence decay times,153

Vacuum, piezoelectric inchworm operation in a, 645
Vacuum ultraviolet (VUV) and soft x-ray mirrors for synchrotron radiation, 504
Valve to real-time optical data processing, application of liquid crystal light, 371
Valve: a review, photo DKDP light, 365
Valves, E-beam DKDP light, 344
Video displays, operator performance using conventional or stereo, 411
Video image processor for real-time x-ray subtraction imaging, digital, 652
Visual perception limits in angiography, 400
Volume phase holographic storage in ferroelectric crystals, 308

Waveguides, characteristics of optical fiber, 114
Welding, high power laser, 210
White-light amplitude interferometer with 180-degree rotational shear, 156
Windscreens: feasibility study phase 1, diamond turning of F-111, 621
Work handler systems integration, industrial laser and, 232
Workhorse for a decade, spin-scan camera system: geostationary meteorological satellite, 6

X-ray aurorae from Spacelab, imaging of, 63
X-ray mirrors for synchrotron radiation, vacuum ultraviolet (VUV) and soft, 504
X-ray quality control, application of Dynalyzer II to, 135
X-ray subtraction imaging, digital video image processor for real-time, 652

# 1978 INDEX TO SPIE REPORTS (Optical Engineering Volume 17)

## AUTHORS AND OTHER PERSONS


Allen, Lew, Jr., Gen., SR-119
Anthony, Romauld, SR-50
Baker, James G., SR-119
Barhydt, Hamilton, SR-28, SR-94
Barnes, Wm. P., Jr., SR-116
Branch, James, SR-49
Caplan, Edward L., SR-116
Caulfield, H. J., SR-8, SR-100, SR-122
DeMund, Charles N., SR-116
Duntley, Siebert Q., SR-116
Durrenberger, J. E., SR-122
Fochtman, Edward G., SR-127
Gonzalez, Rafael C., SR-37
Goodenough, David J., SR-80
Goodman, Joseph W., SR-116
Gott, Allan H., SR-122
Hopkins, Robert E., SR-116
Horstman, Addie, SR-60
Houston, Joseph B., Jr., SR-13, SR-39, SR-114, SR-115, SR-117
Huck, Friedrich O., SR-118
Hyzer, William G., SR-3, SR-33, SR-47, SR-72, SR-96, SR-124
Ingelstam, Erik, SR-116
Johnson, R. Barry, SR-28, SR-94
Jurek, Bohumil, SR-63
Kallard, T., SR-8
Katz, Yale H., SR-60
Kay, David B., SR-118
Kiel, John, SR-122
Kingslake, Rudolf, SR-6, SR-118
Lewis, Robert E., SR-118
Lewis, Mrs. Robert E., SR-118
Lovell, D. J., SR-46, SR-67
Maringer, R. E., SR-8
Marshall, C. W., SR-8
Marshall, Gerald E., SR-116
Olson, Valerie F., SR-122
Pezzuto, Mrs. Albert, SR-116
Ponseggi, Bernard G., SR-122
Poulsen, Peter, SR-118
Poulsen, Mrs. Peter, SR-118
Price, William H., SR-116
Rechtin, Eberhardt, SR-120
Raynolds, George O., SR-127
Ross, Del, SR-74
Sawchuk, Alexander A., SR-37
Schneider, R. H., SR-2, SR-80
Seddon, Ian, SR-107
Seppala, Lynn, SR-63
Shannon, Robert R., SR-122
Spiro, Irving J., SR-3, SR-48, SR-72, SR-96, SR-116, SR-126
Stockham, John D., SR-127
Tescher, Andrew, SR-120
Thompson, Brian J., SR-8, SR-116, SR-118, SR-119
Treffs, David A., SR-122
Waidelich, W., SR-100
Weaver, Kenneth E., SR-80
Wilkerson, Gary W., SR-6
Wintz, Paul, SR-37
Wollensak, Richard J., SR-116


## SUBJECT INDEX


AAPM short courses, SR-12
Academic responsibilities in the development of knowledge, SR-46
Acquisition of a small business, SR-49
American University short courses, SR-37
ASP & ACSM annual spring convention & exhibit 1979 call for papers, SR-100
Battelle seminars and studies program, SR-128
Book reviews: Exploring laser light, SR-8; Dimensional instability, SR-8; Digital image processing, SR-37; Optical surfaces, SR-63; Laser 77 opto-electronics conf. proceedings, SR-100; Particle size analysis, SR-127
BRH invites comment on FDA radiation protection recommendation, SR-111
Business side of optics industry (forum), SR-49, SR-74, SR-107
Calendar, SR-35, SR-62, SR-78, SR-123
Calls for papers (not SPIE), SR-64, SR-82, SR-100
Calls for papers (SPIE), SR-2, SR-24, 3rd cov. S/O 78; 3rd cov. N/D 78; SR-140-141
Digital image processing (book review), SR-37
Dimensional instability (book review), SR-8
Education in optics (forum), SR-46
Effect of F-number and other parameters on FLIR performance in nearly BLIP systems, SR-28, SR-94
European Photonics Assn. formed, SR-61
Exploring laser light (book review), SR-8
Forum columns:
- Business side of optics industry, SR-49, SR-74, SR-107
- Education in optics, SR-46
- Infrared, SR-28, SR-94
- Instant photoinstrumentation, SR-3, SR-33, SR-47, SR-72, SR-96, SR-124
- Radiometry and photometry, SR-3, SR-48, SR-72, SR-96, SR-126
- Systems integration & optical design, SR-6

4th European electro-optics conf. '78 (announcement), SR-11, SR-66
George Washington Univ. short courses, SR-12, SR-37, SR-62, SR-82, SR-99, SR-128
Industrial applications of infrared technology (call for papers), SR-64
Industry news, SR-23, SR-54, SR-86, SR-101, SR-131
Infrared (forum), SR-28, SR-94
Instant fluorescence photography, SR-47
Instant imaging of electric radio and acoustic fields, SR-3
Instant photogrammetry with a grid, SR-124
Instant photoinstrumentation (forum), SR-3, SR-33, SR-47, SR-72, SR-96, SR-124
Instant stereography, SR-96
Instant ultraviolet photography, SR-72
International commission for optics 11th meeting (announcement), SR-11
International optical computing conf. 1978 (announcement), SR-10
International symposium on advances in photopolymer systems (call for papers), SR-64
Katz joins SPIE as technical director, SR-60
Keynote address to 59th optical systems group, SR-39
Laser 77 opto-electronics conf. proceedings (book review), SR-100
Letters to the editor, SR-6, SR-80
Massachusetts Institute of Technology short courses, SR-37
Medical imaging, SR-2
Medical imaging VII call for papers, SR-2
Meeting announcements and reports, SR-9, SR-10, SR-11, SR-64, SR-128
Meeting federal performance standard for laser products (program), SR-16
Minnex II (announcement), SR-10
Modern utilization of infrared technology IV, SR-126
Motivation of engineers, SR-6
New literature, SR-22, SR-57, SR-82, SR-103, SR-130
New products, SR-20, SR-40, SR-50, SR-88, SR-104, SR-132
9th international conf. on laser atmospheric studies (call for papers), SR-64
Nomenclature revisited, SR-96
Northern Calif. microphotomask/masking working group officers, SR-98
Opportunities in thin films to meet energy needs, SR-107
Optech 78: industrial applicatio.ıs of solid state image scanners (announcement), SR-9
Optech 78: light measurement in industry (announcement), SR-11
Optical Engineering, special issues announcement, SR-58
Optical surfaces (book review), SR-63
Particle size analysis (book review), SR-127
Patents, SR-67, SR-91, SR-139
People, SR-19, SR-54, SR-84, SR-100, SR-129
Placement exchange, SR-26, SR-41, SR-69, SR-92, SR-110, SR-142
President's report to SPIE board of governors 1977, SR-13; 1978, SR-114
Problem solving by photonics and applied image recording (announcement), SR-11
Proposed name for line source, SR-48
Radiometry and photometry (forum), SR-3, SR-48, SR-72, SR-96, SR-126
Raphex '78 (announcement), SR-9
Real-time radiologic imaging: medical and industrial applications (announcement), SR-9
Review of seminar on infrared detectors, SR-72
Rochester Institute of Technology short courses, SR-12
Salvaging data from instant negatives, SR-33
2nd international conf. on low light and thermal imaging (call for papers), SR-64
Semiconductor microlithography III (program), SR-18
Short courses, SR-11, SR-37, SR-61, SR-82, SR-99, SR-128
Special interval conversion, SR-3
SPIE awards 1977, SR-17; 1978, SR-114-122
SPIE contributions to Western Washington University, SR-98
SPIE programs, SR-16, SR-18
SPIE scene:pres. report to bd. of gov. 1977, SR-13; new members, SR-38, SR-60, SR-122; keynote address to 59th optical systems group, SR-39; Katz joins SPIE, SR-60; SPIE contributions to WWU, SR-98; No. Calif. microphotomask/masking working group officers, SR-98; 22nd ann. inter. tech. symp. & instr. display, SR-114-SR-123; pres. report to bd. of gov. 1978, SR-114; awards luncheon 1978, SR-15; service citations, SR-115; fellows awards, SR-116, Albert M. Pezzuto award, SR-116, Governors' award, SR-116; awards banquet 1978, SR-117; pres. banquet speech, SR-117; Kingslake medal and prize, SR-118; president's award, SR-118; Alan Gordon memorial award, SR-118, George W. Goddard award, SR-119; Gold medal of the society, SR-119; keynote address, SR-120
SPIE short courses, SR-82
SPIE 22nd inter. symp. and instrument display (call for papers), SR-24
SPSE chemical & effluent management in photographic labs. (call for papers), SR-82
Systems integration and optical design (forum), SR-6
13th inter. congress on high speed photography & photonics (announcement), SR-10, SR-64
UCLA extension (short courses), SR-61
University of Arizona Optical Sciences Center short courses, SR-128
University of California short courses, SR-62
University of Chicago Center for Continuing Education short courses, SR-12
University of Rochester Institute of Optics short courses, SR-11
University of Wisconson Extension short courses, SR-62
Venture capital—how to find it, SR-74
Western Washington University, SR-98